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ABSTRACT

The paper presents two experiments which test the "change in feelings of competence and self-determination" proposition of cognitive evaluation theory. This proposition states that when a person receives feedback about his performance on an intrinsically motivated activity this information will affect his sense of competence and self-determination, thereby affecting his intrinsic motivation. Results of the experiments, performed with undergraduate students, indicate that positive verbal reinforcements decreased intrinsic motivation for females while they increased it for males, and that negative feedback decreased intrinsic motivation presumably by weakening the subject's feelings of competence and self-determination. These data, as well as other related studies, suggest that the traditional widespread use of external rewards and controls has had unintended, negative consequences on motivation and performance. This implies that we should begin to consider intrinsic motivation more carefully and structure reward and control systems which will be less likely to interfere with intrinsic motivation. (Author/SES)

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Sex Differences, Positive Feedback and Intrinsic Motivation

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Abstract

Recent studies by Deci have demonstrated that external rewards can affect intrinsic motivation to perform an activity. Monetary rewards which are made contingent on performance and threats of punishment for poor performance decrease a person's intrinsic motivation for the activity. On the other hand, positive verbal reinforcements have been shown to increase intrinsic motivation for male subjects. The present paper presents evidence that positive verbal reinforcements decreased intrinsic motivation for females while they increased it for males, and that negative feedback decreased intrinsic motivation for both males and females. The results of these experiments are discussed in relation to a cognitive evaluation theory presented earlier by Deci.

A person is intrinsically motivated to engage in a behavior if he does it for no apparent reward except the activity itself (c.f., Berlyne, 1966; Hunt, 1965; Koch, 1956). Engaging in these behaviors allows him to feel a sense of competence and self-determination (White, 1959; de Charms, 1968; Deci, 1972a).

Several recent studies have demonstrated that certain extrinsic rewards decrease a person's intrinsic motivation. Money (Deci, 1971, 1972a) and the avoidance of punishment (Deci and Cascio, 1972) decreased college students' intrinsic motivation for solving puzzles; good player awards decreased preschool children's intrinsic motivation for playing with drawing materials (Lepper, Greene, and Nisbett, in press), and prizes decreased elementary school children's enjoyment of competitive games (Kruglanski, Alon, and Lewis, 1972).

On the other hand, Deci (1971, 1972a) has demonstrated that male subjects displayed an increased amount of intrinsic motivation when they were rewarded with positive verbal feedback from the experimenter.

A Cognitive Evaluation Theory

Deci (1972a, 1972b) has suggested a congitive evaluation theory to account for these findings. There are two processes by which extrinsic rewards can affect intrinsic motivation: (1) a change in perceived locus of causality and (2) a change in one's feelings of competence and self-determination.

When a person is intrinsically motivated the locus of causality (Heider, 1958; de Charms, 1968) is within himself. However, when he receives external rewards he begins to perceive that he is doing the activity for the external reward, so the perceived locus of causality changes from within himself to the external reward leaving him with less intrinsic motivation.

People are intrinsically motivated to perform activities which make them feel competent and self-determining. Therefore, rewards or feedback can affect their intrinsic motivation by affecting their feelings of competence and self-determination. Rewards or feedback that strengthen these feelings enhances intrinsic motivation and feedback (or punishment) that weakens these feelings decreases intrinsic motivation.

The fact that some rewards increase intrinsic motivation and others decrease it, is caused by the fact that every reward has two aspects. The first is a controlling aspect, which initiates the change in perceived locus of causality process. The other aspect to every reward is the information it gives a person about his competence and self-determination. Therefore, whether the "change in perceived locus of causality" process or the "change in feelings of competence and self-determination" process will be invoked depends on which aspect of the reward is more salient. With money and avoidance of punishment, for example, the controlling aspect is very apparent, and indeed they lead to a decrease in intrinsic motivation by changing the perceived locus of causality. On the other hand, the controlling aspect of positive feedback is much less salient, so the informational aspect would be more operative. This would lead to an increase in intrinsic motivation by strengthening the person's sense of competence and self-determination.

It is possible that some people will become dependent on positive verbal feedback. If they are particularly sensitive to positive feedback, the controlling aspect of that reward could over-power the informational aspect and initiate the change in perceived locus of causality process, thereby decreasing intrinsic motivation.

The first experiment to be presented in this paper will investigate the effects of positive verbal feedback on the intrinsic motivation of both males and females. Previous studies (Deci, 1971, 1972a) have shown that when male subjects were given positive feedback by a male experimenter their intrinsic motivation increased. However, in one of the studies (Deci, 1972a) when verbal reinforcements (i.e., positive feedback) were given to females their was a marked, though non-significant, decrease in intrinsic motivation. The aim of this study is to clarify the effects of positive verbal feedback on intrinsic motivation.

Consider now the case of negative feedback. When a person receives negative feedback about his performance on an intrinsically motivated activity, the feedback will weaken his sense of competence and self-determination thereby decreasing his intrinsic motivation. This paper will also present data which investigated the effects of two kinds of negative feedback on intrinsic motivation. The first was negative verbal feedback administered by the experimenter and the second was self-administered negative feedback resulting from failing at the activity.

GENERAL PARADIGM

Subjects in these experiments participated for a one hour session which was divided into two main parts. During the first part, subjects were asked to use puzzle pieces which were provided for them to reproduce four configurations which had been drawn on paper for them to look at. They were allowed ten minutes for each configuration, and if they had been unable to reproduce it in that time, they were stopped and the experimenter explained how to do it.

In each experiment, the subjects in the control group were asked to reproduce puzzle configurations. They received no rewards and no feedback about their performance. The experimental subjects in each study were also asked to reproduce

puzzle configurations; however, they received feedback after each configuration. Interest was in the differences in intrinsic motivation of the experimentals and controls following the puzzle solving period.

To obtain the dependent measure of intrinsic motivation, the experimenter left his position for a period of eight minutes following the puzzle solving under the following pretext. He said that he was going to a computer to input the results of this session and have the computer select a questionnaire which would be most appropriate for this subject to investigate the way he solves problems. The subject was told that he could do whatever he like during that time.

The subject was then alone in the room for eight minutes and was free to work on the puzzles, read magazines, which were in the room, or do anything he liked. Therefore, the amount of time out of the eight minutes which he spent working on the puzzles was used as the dependent measure of intrinsic motivation. It was reasoned that if he worked on the puzzles when he was alone for this "free-choice" time and when he was given an opportunity to do other things, then he must be intrinsically motivated to do the activity. The amount of time out of the eight minutes which the subject spent working on the puzzle was determined by a second experimenter who observed through the one-way window and used a stop watch to record the time. The second experimenter was blind to the condition and also to the hypotheses of the experiment.

This paradigm is described in much greater detail in other places (Deci, 1972a, 1972b).

EXPERIMENT I

Manipulation: This experiment investigated the effects of positive feedback on intrinsic motivation of males and females. Subjects were 32 undergraduate males

and 32 females who participated in the experiment as part of a course requirement.

The 32 control subjects were given four puzzles to solve and received no feedback. The 32 experimentals were given the same puzzles; however, after each puzzle which they solved, they received positive verbal feedback from the experimenter (e.g., "That's very good, it's the fastest that one has been solved.") Following the puzzle solving, subjects were left alone in the room so that their intrinsic motivation could be assessed.

Since earlier findings (Deci, 1972a) suggested that there may be a difference between the effects of positive feedback on males and females, both a male and female experimenter were used to investigate this potential sex difference.

Results: The average number of seconds of free choice time spent by subjects is shown in Table 1. Female subjects who received positive feedback spent less

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Insert Table 1 about here.

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free choice time working on the puzzles than subjects who got no feedback regardless of whether the experimenter was a male or female. In other words, females who received positive verbal feedback showed less intrinsic motivation following the puzzle solving experience than females who received no feedback.

On the other hand, positive feedback increased the intrinsic motivation of males just as it did in previous experiments (Deci, 1971, 1972a). This phenomena was produced when the experimenter was female just as it was when the experimenter was male. The ANOVA summary is presented in Table 1 and shows the "sex of subject X feedback" interaction to be highly significant. The summary table also indicates that there is a main effect ($p < .05$) for sex of subjects. However, this is somewhate

misleading, in that this main effect is caused entirely by the positive feedback condition. The more critical test of whether males and females differ is done by comparing control conditions. Here we see no difference. Women control subjects spent an average of 280.3 seconds while males spent an average of 257.5 seconds of free choice time working on the puzzles.

The main effect for sex of subject simply underscores the strength of the differential effect of positive feedback on males and females since virtually all of the main effect is accounted for by the feedback condition. This experiment then has shown quite clearly that positive feedback has different effects on the intrinsic motivation of males and females. It increases the intrinsic motivation of males, whereas it decreases the intrinsic motivation of females.

EXPERIMENT II

Manipulation: This experiment investigated the effects of negative feedback on intrinsic motivation. Subjects were 96 undergraduates at the University of Rochester who were in one of three conditions: control, negative verbal feedback or failure. The controls and the negative verbal feedback subjects were given the same relatively easy configurations to reproduce and the failure subjects were given much more difficult ones. The only difference between the control and negative verbal feedback conditions was that at the end of each configuration the experimenter made a statement to the negative feedback subjects such as, "Although you did solve that one, your time was below average." The difference between the control and failure condition was that in the failure condition subjects were given more difficult puzzles. It was reasoned that failure at the puzzles would result in "self-administered" negative feedback about their performance.

The experimenter in this study was a male.

Results: The subjects in the failure condition did do less well at solving puzzles than the controls (failure subjects were unable to solve 79% and controls missed 37%), so the manipulation was successful.

Insert Table 2 about here.

Table 2 presents the results of this experiment which were analyzed using a 2x3 analysis of variance. The results indicate that negative feedback, whether verbally administered by the experimenter or self-administered through failure, causes a decrease in intrinsic motivation ($F(2,90) = 5.31$; $p < .01$). Further, there was no sex effect and no sex by treatment interaction.

DISCUSSION

These experiments have tested the "change in feelings of competence and self-determination" proposition of cognitive evaluation theory. The proposition states that when a person receives feedback about his performance on an intrinsically motivated activity this information will affect his sense of competence and self-determination thereby affecting his intrinsic motivation.

If the feedback is positive, it will strengthen his sense of competence and self-determination and in turn enhance his intrinsic motivation for the activity. On the other hand, if the feedback is negative this will weaken the person's sense of competence and self-determination thereby decreasing his intrinsic motivation.

As in previous studies (Deci, 1971, 1972a) positive verbal feedback increased the intrinsic motivation of males; however, it decreased the intrinsic motivation of females. Although this latter change was opposite to the prediction, it can still be explained by the theory. For females, the positive feedback initiated the change in perceived locus of causality process, whereas it did not for males.

One way to account for this difference is in terms of the socialization of males versus females in our society. The role "traditionally" ascribed to women is a more dependent one. Further, they are encouraged to be more sensitive to other people. Consequently, they would be more likely to react to positive feedback from others, and therefore they are more likely to become dependent on it. This of course means that females evaluate the feedback in a way that is different from the way males evaluate it, so the change in perceived locus of causality would be initiated in females but not in males. In other words, due to socialization, the controlling aspect of positive feedback is much more salient for women than for men. One would expect that with heightened concern about the role of women in society, the socialization process may begin to change, though in the past, the sex differences in socialization have been quite clear.

The results presented in this paper about the effects of negative feedback give support to congitive evaluation theory. Negative feedback does decrease intrinsic motivation, presumably by weakening the subjects' feelings of competence and self-determination.

Conclusions: The data have shown consistently that extrincic rewards (except for verbal reinforcement to males) decrease a person's intrinsic motivation, and even interfer with his task performance (Kruglanski, Friedman, and Zeevi, 1971). Negative feedback also decreases intrinsic motivation and leads to poorer performance and less confidence (Feather, 1966, 1968; Feather and Saville, 1967). When taken together all of these studies suggest that the traditional wide-spread use of external rewards and controls (e.g., grades, threats, contingent payments, etc.) has had unintended, negative consequences on motivation and performance. This implies then that we should begin to consider intrinsic motivation more carefully and structure reward and control systems which will be less likely to interfer with intrinsic motivation.

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FOOTNOTES

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TABLE 1

MEAN NUMBER OF SECONDS OF "FREE-CHOICE" TIME SPENT WORKING ON THE PUZZLES, WITH AN ANOVA SUMMARY FOR THE DATA.

	Female Subjects		Male Subjects	
	Female Experimenter	Male Experimenter	Female Experimenter	Male Experimenter
Positive Feedback	157.50 n = 8	136.50 n = 8	454.50 n = 8	340.25 n = 8
Control	205.75 n = 8	354.88 n = 8	239.75 n = 8	275.25 n = 8

Source	d.f.	M.S.	F
A (Feedback)	1	172.4	<1
B (Experimenter Sex)	1	2,438.0	<1
C (Subject Sex)	1	207,138.9	5.714*
AB	1	102,319.9	2.822
AC	1	298,528.9	8.235**
BC	1	42,797.1	1.181
ABC	1	412.8	<1
Error	56	36,252.41	

*p < .05
**p < .01

TABLE 2

MEAN NUMBER OF SECONDS OF "FREE-CHOICE" TIME SPENT WORKING ON THE PUZZLE, AND AN ANOVA SUMMARY FOR THE DATA (ONE-WAY, COLLAPSED ACROSS SEX).

	Males	Females
Control	301.9 n = 16	315.4 n = 24
Negative Verbal Feedback	179.0 n = 8	194.9 n = 16
Self-Administered Negative Feedback Through Failure	170.3 n = 9	152.25 n = 23

Source	d.f.	M.S.	F
Feedback	2	231,897.6	5.31*
Sex	1	2,668.0	<1
Interaction	2	1,304.5	<1
Error	90	43,639.0	

*$p < .01$